

Answer on Question #63893 - Chemistry - General Chemistry

Question: Diamond is a natural form of pure carbon. (a) How many moles of carbon are in a 3.25-carat diamond? (b) How many atoms are in this diamond?

Solution

The carat is a unit of mass equal to 200 mg (0.2 g). So, the mass of the given diamond is $3.25 \times 0.2 = 0.65$ g.

1) Find the amount of substance of carbon in the diamond:

$$n(C) = \frac{m(C)}{M(C)} = \frac{0.65}{12} \approx 5.4167 \times 10^{-2} \text{ mol}$$

2) Find the number of atoms in the diamond:

$$N(C) = n(C) * N_A = 5.4167 \times 10^{-2} * 6.02 \times 10^{23} \approx 3.2608 \times 10^{22} \text{ atoms}$$

Answer: in 3.25 – carat diamond there are 5.4167×10^{-2} moles of carbon and 3.2608×10^{22} atoms of carbon, respectively.